CLAIMS

1. A method of coupling a spliceable optical fibre for transmission of light in its longitudinal direction to an optical component, the method comprising:

(A) providing the spliceable optical fibre, said spliceable optical fibre comprising:

(a) a core region (10, 20, 25, 30, 110); and

(b) a microstructured cladding region, said cladding region surrounding said core region and comprising:

(b1) an inner cladding region with inner cladding features (13, 22, 112) arranged in an inner cladding background material (11, 21, 111) with a refractive index n1, said inner cladding features comprising thermally collapsible holes or voids, and

(b2) an outer cladding region with an outer cladding background material (12, 24, 114) with a refractive index n2;

said spliceable optical fibre having at least one end;

(B) collapsing said thermally collapsible holes or voids by heating said least one end of said spliceable optical fibre; and

(C) coupling said collapsed spliceable optical fibre end to the optical component.

2. The method according to claim 1 wherein said collapsing of said thermally collapsible holes or voids being gradual and/or abrupt.

3. A method according to claim 1 or 2 wherein said thermally collapsible holes or voids are wholly or partially collapsed.

4. A method according to any one of claim 1 to 3 wherein said heating is being adapted so that a guided mode at said at least one end of the spliceable optical fibre is confined by an index profile determined by background materials of the core and the inner cladding.

5. A method according to any one of claims 1-4 wherein said heating is provided by a fusion splicer.

6. A method according to any one of claims 1-5 wherein said coupling comprises fusing of said at least one collapsed spliceable optical fibre end and said optical component.

7. A method according to any one of claims 1-6 wherein said optical component is an optical fibre, an optical connector, or a combination thereof.

8. The method according to claim 7 wherein said optical fibre is a photonic crystal fibre, or a non-microstructured optical fibre.

9. An article comprising a spliceable optical fibre coupled to an optical component obtainable by the method defined in claims 1-8.

10. A spliceable optical fibre for transmission of light in its longitudinal direction, the optical fibre having a cross section (71) perpendicular to the longitudinal direction, said optical fibre comprising

(a) a core region (10, 20, 25, 30, 110); and

(b) a microstructured cladding region, said cladding region surrounding said core region and comprising:

(b1) an inner cladding region with inner cladding features (13, 22, 112) arranged in an inner cladding background material (11, 21, 111) with a refractive index n_1, said inner cladding features comprising thermally collapsible holes or voids, and

(b2) an outer cladding region with an outer cladding background material (12, 24, 114) with a refractive index n_2;

wherein said n_1 being larger than n_2.

11. The optical fibre according to claim 10 comprising a collapsed section or an end wherein said inner thermally collapsible holes or voids are collapsed.

12. A optical fibre according to claim 10 or 11 wherein said inner cladding features have a size of d_1 and said outer cladding region comprises outer cladding features (23) of size d_2.

13. A spliceable optical fibre for transmission of light in its longitudinal direction, the optical fibre having a cross section (71) perpendicular to the longitudinal direction, said optical fibre comprising

(a) a core region (10, 20, 25, 30, 110); and

(b) a microstructured cladding region, said cladding region surrounding said core region and comprising:

(b1) an inner cladding region with inner cladding features (13, 22, 112) arranged in an inner cladding background material (11, 21, 111) with a refractive index n_1, said inner cladding features comprising thermally collapsible holes or voids having a size d_1, and

(b2) an outer cladding region with an outer cladding background material (12, 24, 114) with a refractive index n_2, said outer cladding comprising thermally collapsible holes or voids having a size d_2;

wherein d_2 is larger than d_1.

14. The optical fibre according to claim 13 comprising a collapsed section or a collapsed end wherein said inner thermally collapsible holes or voids are collapsed.

15. An optical fibre according to claim 13 or 14 wherein n_1 equals n_2.

16. An optical fibre according to claim 13 wherein n_1 is larger than n_2.

17. An optical fibre according to any one of claims 10-16 wherein n_1 and n_2 are different by less than 2%, such as less than 1%, such as less than 0.5%.

18. An optical fibre according to any one of claims 10-17 wherein the optical fibre comprises silica-based materials.

19. An optical fibre according to any one of claims 10-18 wherein said core region comprises a material with a refractive index n_{core}, and n_{core} is equal to n_1.

20. An optical fibre according to any one of claims 10-18 wherein said core region comprises a material with a refractive index n_{core}, and n_{core} is larger than n_1.

21. An optical fibre according to any one of claims 10-18 wherein said core region comprises material with a refractive index n_{core}, and n_{core} is smaller than n_1.

22. An optical fibre according to any one of claims 10-21 wherein said core region comprises a material with a refractive index n_{core}, and n_{core} is smaller, equal to, or larger than n_2.

23. An optical fibre according to any one of claims 10-22 wherein said core region has a diameter smaller than or equal to 3.0 μm.

24. An optical fibre according to any one of claims 10-23 wherein said optical fibre has at least one position, position 1 (71), along its length where a guided mode at a given wavelength, λ, is confined to the core region by the presence of inner cladding features, and λ is in the range from 0.4 μm to 2.0 μm.

25. An optical fibre according to any one of claims 10-24 wherein the core region has a largest dimension, r_{PCF}, being in the range of 0.8 μm to 3.0 μm.

26. An optical fibre according to any one of claims 10-25 wherein the inner cladding region has a largest dimension, r_{solid}, being in the range of 3.0 μm to 15.0 μm.

27. A preform for producing a spliceable optical fibre as defined in claims 10-26, the preform comprising longitudinal preform elements comprising:

(a) at least one core element (120) comprising a material with refractive index n_{core};

(b) inner cladding elements (121) comprising a tubular element of a material with refractive index n_1, said tubular element being adapted to form a collapsible hole or void in the spliceable optical fibre; and

(c) outer cladding elements (122) comprising a material with refractive index n_2.

28. The preform according to claim 27 wherein n_1 is larger than n_2.

29. The preform according to claim 27 wherein said tubular element of the inner cladding has an inner dimension $d_{1,preform}$ and said outer cladding elements comprising a tubular element with an inner dimension $d_{2,preform}$, and $d_{2,preform}$ is larger than $d_{1,preform}$.

30. A method of producing a spliceable optical fibre as defined in claims 10-26, the method comprising drawing an optical fibre from a preform according to claims 27-29.

31. A spliceable optical fibre as defined in claims 10-26 obtainable by the method defined in claim 30.

32. A heat-treated spliceable optical fibre comprising a spliceable optical fibre as defined in claims 10-26, or a spliceable optical fibre obtainable by the method defined in claim 30, prepared by a heat-treatment of at least one end or a section of the spliceable optical fibre.

33. An article comprising a spliceable optical fibre according to any one of claims 10-26, or a spliceable optical fibre and optical component coupling obtainable by the method defined in any one of claims 1-8, wherein said article is a non-linear fibre component, or a dispersion compensating fibre component.